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(54) Viewing window for saw guard and method for making same

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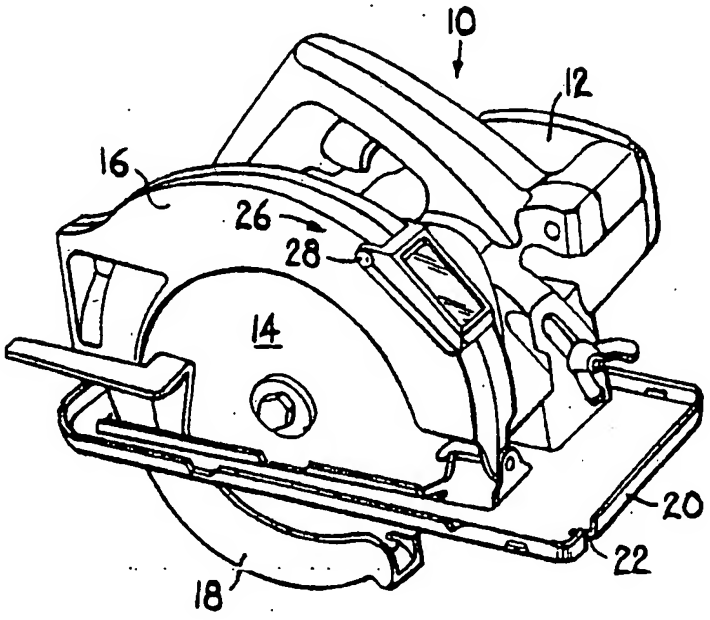

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 3592

DOCUMENTS CONSIDERED TO BE RELEVANT

	Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
5	X	DE 40 38 415 A (AUTZ & HERRMANN MASCHF) 11 June 1992 * column 1, line 3 - line 9 * * column 8, line 34 - line 45; figure 2 *	1,4,5,9, 10	B27G19/04 B27B9/00
	Y		2,3,6	
5	X	US 4 823 511 A (HERLICZEK SIEGFRIED H ET AL) 25 April 1989 * column 1, line 6 - line 11 * * column 4, line 47 - line 61 * * column 5, line 11 - line 26 * * column 6, line 37 - line 47 * * column 6, line 55 - column 7, line 6; figures 3,8 *	11,13, 14,16-18	
	Y	* figure 8 *	2	
12	X	US 4 543 283 A (CURTZE EDWARD W ET AL) 24 September 1985 * column 1, line 5 - line 10 * * column 4, line 19 - line 48; figures 1,2 *	11-14	
	Y	* column 4, line 33 - line 39 *	3	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B27G B23D B29C
5	Y	US 4 675 999 A (ITO MASANORI ET AL) 30 June 1987 * column 6, line 44 - line 68; figures 12,13 *	6	
8	D,A	US 4 450 627 A (MORIMOTO HIROYUKI) 29 May 1984 * the whole document *	1	
2	A	US 1 830 579 A (WAPPAT) 3 November 1931		
5	A	US 3 998 254 A (MORIN MARIUS JOSEPH) 21 December 1976		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 July 1998	Huggins, J

CATEGORY OF CITED DOCUMENTS

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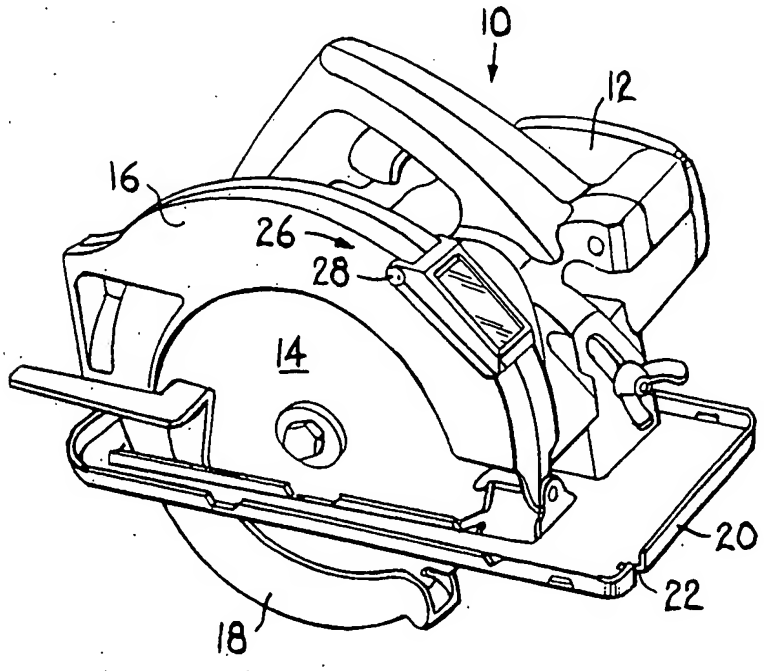

FIG.1

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Description

The present invention relates to a viewing window for a power tool guard and, in particular, a viewing window which allows an operator to see a moving cutting tool of the power tool.

One of the problems associated with the use of hand-held power tools is properly aligning the cutting tool of the power tool so that the desired cut is achieved. One particular type of power tool where this problem is especially prevalent, is a hand-held circular saw. When using a hand-held circular saw, an operator will normally draw a line on the workpiece indicating the direction and pattern of cut. Circular saws typically have an upper saw guard which encases an upper peripheral portion of the blade. This upper saw guard prevents the operator from seeing whether the blade itself is actually following the marked cut line. Therefore, problems arise when the user initially attempts to align the saw blade with the cut line and further continues as the user attempts to keep the blade tracking upon the cut line.

Attempts have been made in the past to allow the user of a saw to view the blade of the saw through the guard and thus determine if the blade is properly tracking along the desired cut line. One such device is disclosed in U.S. Patent No. 4,450,627. This patent discloses a circular saw with a clear viewing window on the upper saw guard. The structure disclosed in this patent suffers from various disadvantages. More specifically, the window is disclosed as being made of a transparent plastic material. First, plastic materials typically are susceptible to being electrostatically charged such that dust particles are likely to be attracted to the plastic surface. Thus, dust particles generated during the sawing operation are attracted to the plastic window due to the window maintaining an electrostatic charge. As is apparent, this static-induced dust contamination of the transparent window results in the operator not being able to see the blade as it passes through the workpiece, thus preventing the window from being effective. An additional problem associated with plastic windows is the fact that they are more susceptible to being scratched if the window is wiped clean of dust particles. More specifically, attempting to wipe the window of dust particles with a cloth will result in the dust particles digging into the soft plastic material, thus resulting in marring and scratching of the window. This marring and scratching, again, will obstruct the operator's view of the saw blade through the window. Therefore, a window construction is needed which will reduce the problem of static-induced dust contamination and, further, which will be resistant to scratching during a manual cleaning operation of the window.

It is an object of the present invention to provide a viewing window for the guard of a power tool which is resistant to the collection of dust thereon due to static electricity.

It is another object of the present invention to provide a viewing window which can be easily cleaned of dust and other particles without marring or scratching the surface of the window.

A further object of the present invention is to provide a window with improved longevity for covering the aperture formed in the guard even if impacted by projectiles generated by the cutting tool or by external impacts to the tool housings (such as accidental drops).

Yet another object of the invention is to provide a method for making a scratch-resistant and static-induced dust contamination resistant viewing window that is efficient and cost-effective.

The present invention provides a window assembly for a power tool, the power tool having a guard to shield a moving cutting tool, the window assembly adapted to be attached to the guard and to cover an aperture formed in the guard to allow an operator to view the cutting tool as it engages a workpiece, characterised in that the window assembly comprises: a glass plate having an upper surface, a lower surface and a peripheral edge and configured to generally cover the guard aperture; a plastic layer having a peripheral edge and positioned on the upper surface; and a frame adapted to be attached to the guard and engaging the peripheral edge of the glass plate and the peripheral edge of the plastic layer.

The present invention, further provides a method of making a window assembly for a power tool, the power tool having a guard to shield a moving cutting tool, the window assembly adapted to be attached to the guard and to cover an aperture formed in the guard to allow an operator to view the cutting tool as it engages a workpiece, characterised in that the method comprises: positioning a plastic layer on the upper surface of a glass plate, the layer and the plate each having a peripheral edge and configured to generally cover the guard aperture; and moulding a frame to engage the layer peripheral edge and the plate peripheral edge, the frame adapted to be attached to the guard so that the combined layer and plate generally cover the guard aperture.

First, second and third embodiments of a window assembly are shown in the accompanying drawings, in which like reference numerals are used to indicate like parts in the various views, and in which:

Figure 1 is a top perspective view of a circular saw having a viewing window;

Figure 2 is a top plan view of the viewing window shown in Figure 1, parts being broken away and shown in cross section to reveal details of construction;

Figure 3 is a cross-sectional view taken generally along line 3-3 of Figure 2 and showing the peripheral edges of the glass plate and plastic layer engaged by the frame;

Figure 4 is a view similar to Figure 3 showing an alternative embodiment of the present invention; and

Figure 5 is a view similar to Figure 3, but showing a further alternative embodiment of the present invention.

Referring to the drawings in greater detail, and initially to Figure 1, a power circular saw designated generally by the numeral 10 is shown. Saw 10 has a motor 12 which is operably attached to a circular saw blade 14. A power cord (not shown) supplies electrical power to motor 12. The upper portion of blade 14 is surrounded by an upper saw guard 16. Upper guard 16 is fixedly secured to motor 12. The lower portion of blade 14 is surrounded by a lower saw guard 18. Saw 10 further has a planar base 20 with an alignment notch 22.

Lower guard 18 exposes the lower portion of blade 14 in a manner that is well-known in the art. More specifically, the front edge of lower guard 18 engages the leading edge of a workpiece (not shown). As the saw passes further into a workpiece, lower guard 18 is rotated generally upwardly to expose the lower portion of the blade. Guard 18 is spring-loaded so that when saw 10 is disengaged from a workpiece, lower guard 18 returns to its lower blade covering position.

Upper guard 16 is provided with a clear viewing window assembly 26. Window 26 allows the user of saw 10 to view blade 14 as it exits a workpiece, thereby allowing the user to initially align and maintain alignment along the desired cutting path of saw 10. Window 26 can be mounted to guard 16 through a pivot arrangement 28 which allows upwardly pivoting of window 26 for cleaning of the interior surface of the window, as will be more fully described below.

Window assembly 26 is used to cover an aperture 30 formed in upper guard 16. Window 26 has a generally rectangular glass plate 34 which is generally sized to cover aperture 30. Plate 34 has a peripheral edge 36 which is comprised of a pair of width segments 38 and a pair of length segments 40. Plate 34 also has an upper surface 42 which, when window 26 is positioned over aperture 30, generally faces the operator and a lower surface 44 which, when window 26 is in position, generally faces blade 14. Plate 34 is preferably of a tempered glass type such that it has improved durability and resistance to breakage from projectiles being propelled through the cutting action of blade 14 moving through a workpiece or from external impacts to the tool housings. As is apparent, although plate 34 is shown as rectangular, other suitable shapes, such as an oval shape, could be used. Further, although plate 34 is shown as planar, it could also have a curved or arcuate shape.

Positioned on upper surface 42 of plate 34 is a plastic layer or film 46. Plastic layer 46 is also generally rectangular in shape and has a peripheral edge 48 comprised of a pair of width segments 50 and a pair of length segments 52. Plastic layer 46 is preferably formed of a transparent film constructed from multiple layers of polyester bonded together with cross-grained orientation. Layer 46 can be attached to plate 34 by a suitable pressure-sensitive adhesive.

As best shown in Figures 2 and 3, peripheral edge 48 of layer 46 extends outwardly a small distance beyond peripheral edge 36 of plate 34. This overhanging portion of layer 46 extends around the complete periphery of plate 34. The purpose of this overhang will be more fully described below.

A frame 54 engages the entire peripheral edges 36 and 48 of glass plate 34 and plastic layer 46, respectively. Peripheral edges 36 and 48 are received in a channel 56 formed by frame 54. Frame 54 is generally rectangular in shape and extends a small distance inwardly over the upper surface of plastic layer 48 and inwardly a small distance over the lower surface of glass plate 34 as best shown in Figure 3. In this manner, peripheral edges 36 and 48 are firmly held by frame 54. Frame 54 is preferably formed of a synthetic polymeric/copolymeric material and is substantially rigid. Frame 54 can be formed with apertures to allow attachment of the finished window assembly 26 to upper guard 16 via pivot arrangement 28. Frame 54 is also formed with a generally rectangular edge 58 which engages a portion 60 of guard 16 that forms aperture 30.

The window assembly 26 described above is advantageous over prior window structures for numerous reasons. More specifically, having glass plate 34 oriented such that its lower surface is exposed to dust and other debris generated by blade 14 significantly reduces the possibility of dust collecting upon the window and obstructing the view of the operator. Glass plate 34 resists static-induced dust contamination of the window. Further, if the window is wiped clean with a cleaning cloth, as can be done if window 26 is pivoted upwardly about pivot arrangement 28, the glass plate is less likely to be scratched than if the window was made completely of a plastic material. Thus, utilising the inner glass plate prevents marring or scratching of the window which would obstruct the view of the operator through the window, and thus hinder the effectiveness thereof.

Plastic layer 46 on upper surface 42 of plate 34 also offers great advantages. First of all, the plastic layer of film can be inexpensively coloured or tinted to add diversity and styling to the window. Further, it is preferable to add a scratch-resistant coating to the upper surface of the layer. Additionally, if the glass should become broken or shattered due to contact with a projectile generated by blade 14 or due to external impact to the tool housing, layer 46 is designed to maintain the broken pieces of glass plate 34 within frame 32 due to the adhesive attachment of layer 46 with plate 34, thereby preventing aperture 30 from being exposed even if plate 34 becomes broken due to projectile or external impact damage.

The overlap of frame 54 over the glass peripheral edge 36 and plastic peripheral edge 48 serves to provide a suitable mounting structure for the combined plate and layer. It also serves to ensure that layer 46 is maintained on plate 34 and to prevent the peeling of lay-

er 46 off of plate 34.

Window 26 is manufactured by first cutting or forming glass plate 34 to the proper size and shape. To provide maximum durability, the glass plate is then either chemically or heat strengthened. A transparent plastic layer, preferably a polyester film, is then applied over the entire upper surface of the glass plate. The layer is attached to the glass plate with a pressure-sensitive adhesive. Layer 46 can be pre-cut to its shape prior to being applied to the plate 34, or can be cut to its desired shape after the layer has been applied to the plate. The plastic layer is formed such that its peripheral edge extends beyond the peripheral edge of the glass plate over the entire extent thereof or over the length of opposite edges. More specifically, the plastic layer is oversized so that its width segments and/or length segments extend outwardly beyond the width segments and/or length segments of the glass plate. The combined glass plate and plastic layer is then positioned in a mould and a synthetic polymeric/copolymeric material is injection-molded into the mould cavity to form the peripheral frame. The frame can also be injection-molded to have one or more pairs of apertures to allow connection to upper guard 16 via pivot arrangement 28. This injection-moulding process allows frame 54 to overlap and engage peripheral edges 36 and 48 or plate 34 and layer 46, respectively. Thus, the combined structure of the glass plate and plastic layer is securely held within the frame due to the hardening of the frame about the peripheral edges thereof. The extension of the peripheral edge of the plastic layer outwardly from the peripheral edge of the glass plate aids in the orientation of the combined plate/layer structure within a mould cavity. More specifically, a person performing the manufacturing process can readily tell which surface is to be the upper surface of the window (the plastic layer) and which is to be the lower surface (the glass plate). Thus, the possibility of the window being inverted with the plastic layer facing the blade of the saw is reduced.

With reference to Figure 4, an alternative window assembly 62 is shown. Assembly 58 is generally the same as assembly 26, except that peripheral edge 48 of plastic layer 46 does not overlap peripheral edge 36 of glass plate 34. Window assembly 58 is manufactured according to the same methods as window assembly 26.

With reference to Figure 5, a further alternative window assembly 64 is shown. In assembly 64, plastic layer 46 is formed integrally with frame 54 during the moulding process. More specifically, plastic layer 46 is formed at the same time as frame 54 through injection-moulding. As is apparent, at least the material from which plastic layer 46 is formed must be transparent in nature. Therefore, both frame 54 and plastic layer 46 can be transparent in nature. However, it may be desirable to mould frame 54 with a material having a pigment and mould plastic layer 46 with a transparent material or to form a textured surface on frame 54 and a smooth transparent surface on layer 46.

Claims

1. A window assembly (26) for a power tool (10), the power tool having a guard (16) to shield a moving cutting tool (14), the window assembly adapted to be attached to the guard and to cover an aperture (30) formed in the guard to allow an operator to view the cutting tool as it engages a workpiece, characterised in that the window assembly comprises: a glass plate (34) having an upper surface (42), a lower surface (44) and a peripheral edge (36) and configured to generally cover the guard aperture; a plastic layer (46) having a peripheral edge (48) and positioned on the upper surface (42); and a frame (54) adapted to be attached to the guard and engaging the peripheral edge of the glass plate and the peripheral edge of the plastic layer.

2. A window assembly according to claim 1 characterised in that the said plastic layer (46) and the frame (54) are integrally formed.

3. A window assembly according to claim 1 characterised in that the plastic layer (46) is attached to the glass plate (34) with an adhesive.

4. A window assembly according to claim 1 characterised in that the glass plate is generally planar.

5. A window assembly according to claim 1 characterised in that the frame (54) generally surrounds the plate peripheral edge (36) and the layer peripheral edge (48).

6. A window assembly according to claim 5 characterised in that the plate (34) and the layer (46) are both generally rectangular in shape and in that the plate peripheral edge (36) and the layer peripheral edge (48) each have two width segments (38, 50) and two length segments (40, 52).

7. A window assembly according to claim 1 characterised in that the layer peripheral edge (48) extends outwardly beyond the plate peripheral edge (36).

8. A window assembly according to claim 7 characterised in that the layer peripheral edge (48) extends outwardly beyond the plate peripheral edge (36) over its entire extent.

9. A window assembly according to claim 1 characterised in that the plate peripheral edge (36) and the layer peripheral edge (48) are received in a channel (56) formed in the frame (54).

10. A window assembly according to claim 1 characterised in that the plastic layer (46) is made of polyester.

11. A method of making a window assembly (26) for a power tool (10), the power tool having a guard (16) to shield a moving cutting tool (14), the window assembly adapted to be attached to the guard and to cover an aperture (30) formed in the guard to allow an operator to view the cutting tool as it engages a workpiece, characterised in that the method comprises: positioning a plastic layer (46) on the upper surface (42) of a glass plate (34), the layer and the plate each having a peripheral edge (48, 36) and configured to generally cover the guard aperture; and moulding a frame (54) to engage the layer peripheral edge and the plate peripheral edge, the frame adapted to be attached to the guard so that the combined layer and plate generally cover the guard aperture.

12. A method according to claim 11 characterised in that it further comprises: securing the plastic layer (46) to the glass plate (34) with an adhesive.

13. A method according to claim 11 characterised in that the glass plate is generally planar.

14. A method according to claim 11 characterised in that the frame (54) is formed generally to surround the plate peripheral edge (36) and the layer peripheral edge (48).

15. A method according to claim 11 characterised in that the layer (46) is positioned on the plate (34) so that the layer peripheral edge (48) extends outwardly beyond the plate peripheral edge (36).

16. A method of making a window assembly (26) for a power tool (10), the power tool having a guard (16) to shield a powered cutting tool (14), the window assembly adapted to be attached to the guard and to cover an aperture (30) formed in the guard to allow an operator to view the cutting tool as it engages a workpiece, characterised in that the method comprises: providing a glass plate (34) with an upper surface (42), a lower surface (44), and a peripheral edge (36); and moulding a frame (54) to engage and hold the peripheral edge and so that the frame has a transparent portion that at least partially covers the upper surface of the plate.

17. A method according to claim 16 characterised in that the glass plate (34) is generally planar.

18. A method according to claim 16 characterised in that the frame (54) is formed generally to surround the plate peripheral edge (36).

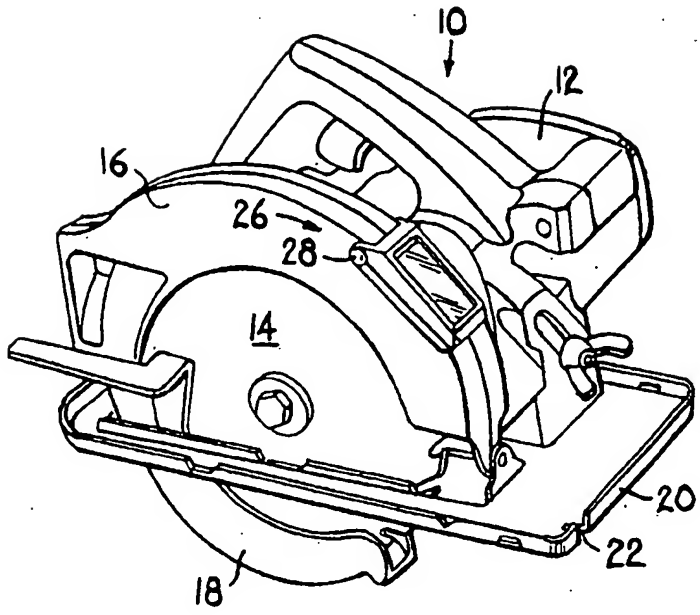

FIG. 1

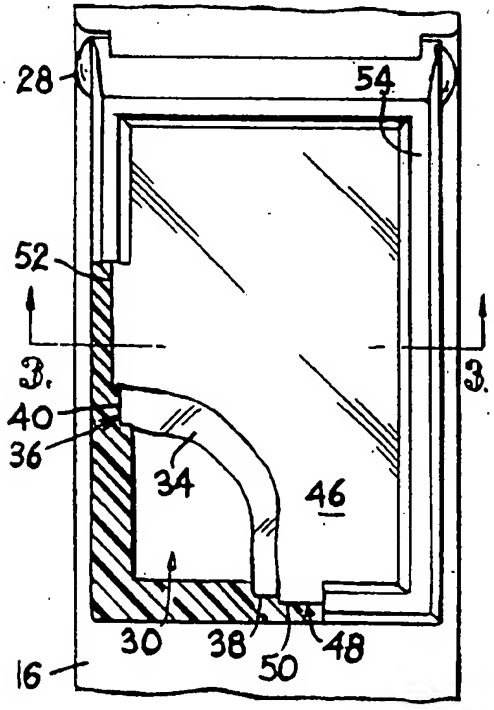

FIG. 2

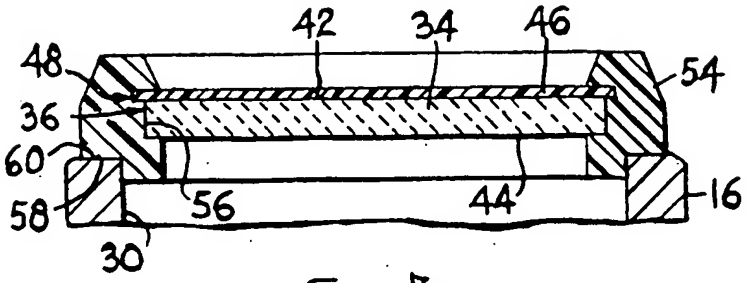

FIG. 3

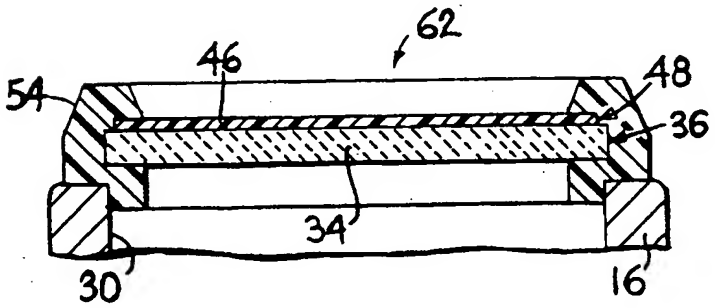

FIG. 4

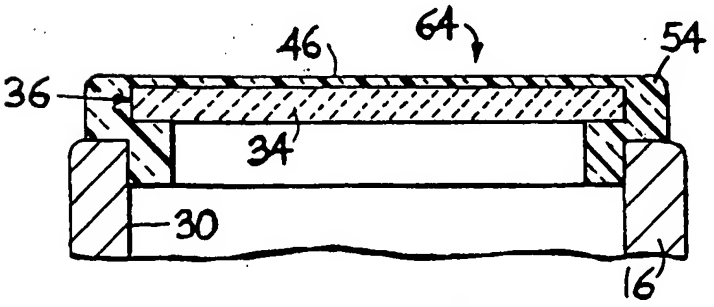

FIG. 5